## Towards Ecosystem-based Coastal Management

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As currently managed, Maine's coastal waters are regarded as an extension of Maine's market-driven, natural-resource economy. Ecosystem-based management turns this model around so that coastal uses such as wildlife watching, recreation, and harvesting are seen to be enabled by specific ecological conditions, habitats, and communities at particular sites along the coast. This change in perspective shifts human expectations from receiving the benefits of a mythical cornucopia to taking stewardship responsibility for assuring the sustainable functioning of complex interactive natural systems whose workings we will never fully understand. Ecosystem-based management suggests that sustainable coastal uses and harvests depend on our not trying to manage natural systems but instead managing the uses we make of them so that our impacts remain minimal. Instead of pretending we can manage the coast itself, we turn our attention to managing ourselves and the uses we make of the coast.

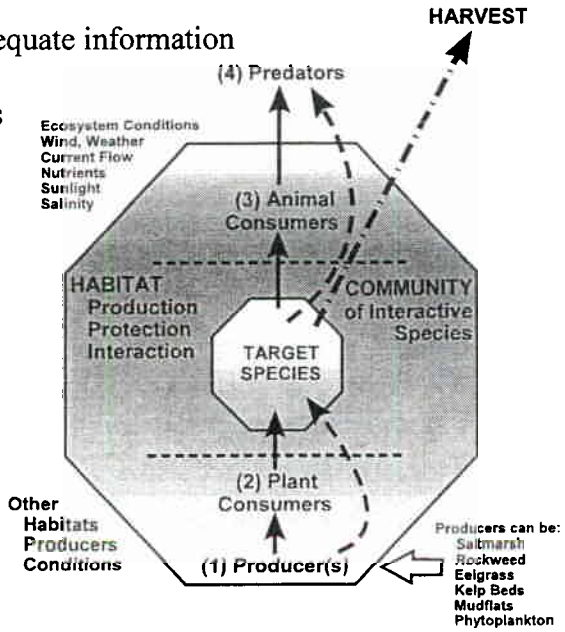
### Four aspects to consider when we use a coastal ecosystem:

1. Trophic (nourishment) levels
   Plant production, plant consumption, animal consumption, predation
2. Productive and protective habitats
   Saltmarsh, rockweed, kelp, eelgrass, mudflats, water column, &c.
3. Ecological communities in different habitats
4. Physical features and influences, including:
   Climate, weather, currents, erosion, nutrients, land use, pollution, etc.

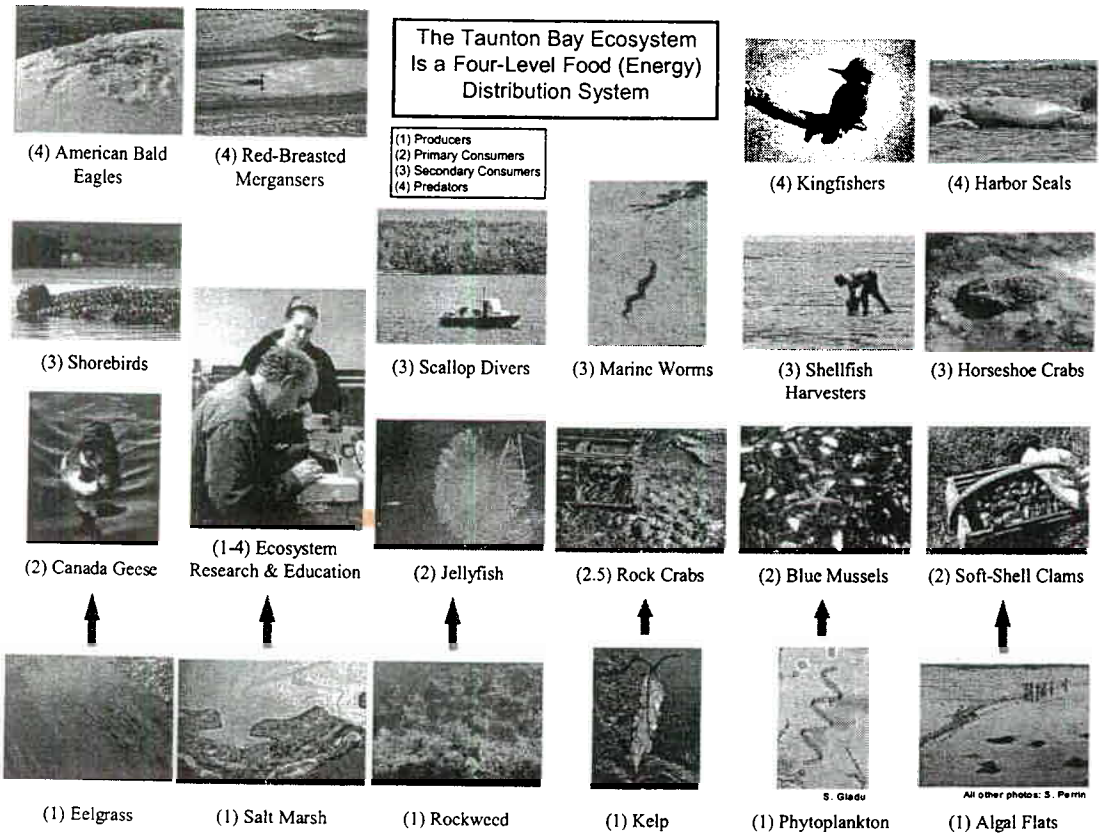
### A possible management structure for ecosystem-based management

- Combined state and local management through regional councils (counties / regions)
- Neither top-down nor bottom-up, but cooperative management between levels and agencies
- Representation from towns, watershed groups, residents, all users, state agencies, et al.
- Councils are advocates for long-term coastal stewardship and sustainability of all uses
- Responsibilities include:
  - Coastal planning
  - Coastal education and participation
  - Monitoring and research programs to assure adequate information
  - Resolution of user conflicts
  - Publication of reports and educational materials

**Ecosystem-based management** considers target species within their ecological settings, including the habitats where they are found, the community of species with which they interact, the roles of these various species, the physical conditions that affect them all, and the consequences of target species removal for the ecosystem as a whole.




Ecosystem-Based Management Means
Multi-Species & Habitat Use Management




**Sketch of an Estuary Habitat-based Food Web for Taunton Bay** Note: Columns are not meant to be mutually exclusive.

| | | | | | | |
|---|---|---|---|---|---|---|
| **4 Top Consumers (Predators)** | Harbor seals<br>Mergansers | Cormorants<br>Common Loons | Bald eagles<br>Ospreys | Gt. blue herons<br>Hakes | Ring-billed gulls<br>Bonaparte's gulls | Humans<br>Kingfishers |
| **3 Animal Consumers** | Black ducks<br>Clam worms<br>Bloodworms | Sea stars<br>Herring gulls<br>Green crabs | Rock crabs<br>Lobsters<br>Flounders | Mummichogs<br>Silversides<br>Mallards | Moon snails<br>Horseshoe crabs<br>Shorebirds | Seal pups<br>Whelks<br>Snails |
| **2 Plant Consumers** | Canada geese<br>Microbes<br>Crangon shrimp<br>Snails | Sea urchins<br>Scallops<br>Blue mussels<br>Copepods | Periwinkles<br>Barnacles<br>Limpets<br>Chitons | Worms<br>Soft-shelled clams<br>Baltic clams<br>Mud snails | Nematodes<br>Amphipods<br>Gem clams<br>Mud shrimp | Zooplankton<br>Herring<br>Alewives<br>Shad<br>Menhaden |
| **1 Producers (Plants, Algae)** | **EELGRASS** (*Zostera marina*) | **KELP** (*Laminaria longicruris*) | **ROCKWEED** (*Ascophyllum nodosum*) | **MARSH GRASS** (*Spartina alterniflora*) | **DETRITUS, BLUE-GREEN ALGAE** | **PHYTOPLANKTON** (Diatoms, Dinoflagellates) |
| **Habitat Type** ⇨ | **Eelgrass Bed** | **Kelp Bed** | **Rockweed** | **Saltmarsh** | **Mudflat** | **Water Column** |

Based on all habitats having adequate nutrients, carbon, sunlight, substrate, and temperature-salinity-current regimes.

Each habitat type centers on a primary food producer and includes the community of life which it supports and protects. **Eelgrass, kelp, rockweed, and salt marsh grass** are located at particular sites where conditions favor their growth and survival. Intertidal and subtidal **mudflats** are the dominant habitat type in Taunton Bay; the life they support goes largely unseen, either because it is microscopic or because it lives below the surface of the mud. **Phytoplankton** are microscopic, free-floating life forms that create plant tissue through photosynthesis; eaten by free-swimming animals (zooplankton) in the water column, they form the basis of the marine food web. **Detritus** is waterborne plant material supporting a colony of microbes, which, because of the microbes, can contain as much as 25% protein.

S. Perrin, January 24, 2006